1. If you leave any part of this question blank, your assignment will not be marked and its weight will be transferred to the final exam.

Print the name and ID number of each group member (at most 4) for this assignment:

__________________________________________________________________________

__________________________________________________________________________

__________________________________________________________________________

Acknowledged all sources, including all references and all people not in your group with whom you discussed any part of any question (for each discussion, list the relevant questions) (continue on the back of this page if there is insufficient space):

__________________________________________________________________________

Each group member must read, agree to, and sign this statement:

I am familiar with the Code of Student Behaviour. I understand that there are significant penalties for any infraction of this Code, including failure to acknowledge sources. I have not shared any written or printed version of any of my answers with any other student.

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__________________________________________________________________________
2. Consider this hex position with White to move. Explain why B1 is not a winning move.

3. Above, give a winning move and explain why it wins, or explain why there are no winning moves.

4. In year __________ the computer program ______________ defeated Gary Kasparov in chess. Why does the search algorithm that worked well in chess does not work well in computer go?

5. For the AlphaGo 2016 Nature paper, name the 1st, 2nd, and last authors and explain their roles.

6. In October 2015 AlphaGo played suboptimal moves against Fan Hui, so some experts expected AlphaGo to lose to Lee Sedol. But some such moves were not errors, because

   Also, AlphaGo improved by March 2016, because (give 2 reasons)
7. Watch the AG-LS game 1 using the viewer at https://deepmind.com/research/alphago/match-archive/alphago-games-english/. The game info says basic time 120 min, overtime 3x60 byoyomi. What is a byoyomi, and when is it used up?

What does move 26 commentary say about AlphaGo’s time usage during the match?

Why might have Lee Sedol have found it a challenge to play against this time usage?

8. In go, what is a passive playing style?

9. Consider this go position with White to play:

   In this position, by Tromp-Taylor rules, White has __________ stones and __________ territory points, Black has __________ stones and __________ territory points, so if neither player moves again, __________ wins by __________ points.

   From the diagram, if White plays A2, Black’s best reply is __________ because __________.

   From the diagram, if White passes and Black plays A5, White’s best reply is __________ and (assuming both players then play best possible) the final score will be __________ wins by __________ points.

   From the diagram, if White plays D5 then Black’s best reply is __________ and (assuming both players then play best possible) the final score will be __________ wins by __________ points.
10. Explain why a 19×19 hex game ends after at most 361 moves.

Explain why a 19×19 go game can last more than 361 moves.

11. Consider a search tree with with one node at the root (level 0) and with each node at levels 0 through 9 having 4 children (so, 1 node at level 0, 4 nodes at level 1, 16 nodes at level 2, . . .). Give the number of nodes at level 10. ________________ In go, suppose that for any position you could (by magic) instantly identify at most four moves, with the property that the best move is one of those four, and that in any position in which at least 100 moves has been made you could (by magic) correctly predict the winner. How many positions would you would need to examine in order to find the best move from the original position? ________________ Explain briefly

12. From the 396 github code repo, install directory simple/maze. Explain briefly how to modify maze.py to make it deterministic.

In maze.py, uncomment line 61, and comment out line 61. This changes the data structure from a FIFO list to a ________________ list. On average, over all possible locations of the target, does this change (i) increase (ii) not change (iii) decrease the number of while loop iterations of this code on a fixed input? Explain briefly.

On your machine execute python3 rmaze.py < m.txt 10 times. What was the fewest number of looks required? ________________ For m.txt, what is the minimum possible number of looks? ________________ What was the largest number of looks required? ________________ For m.txt, what is the maximum possible number of looks? ________________